

# A Review of a Selected *Ayurvedic* Herbal Formula in the Management of *Suryavarta* (Frontal Sinusitis): A Comprehensive Analysis

Samaranayaka Liyanage Gayani Sewwandi, Rajendran Vladimir Vidhyajini, Singappuli Arachchige Madushi Randika Rupasinghe

Temporary demonstrator, Department of Cikitsa, Faculty of Indigenous Medicine, Gampaha Wickramarachchi University of Indigenous Medicine, Yakkala, Sri Lanka

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## ABSTRACT

The most prevalent clinical ailment among patients who present to physicians with a headache as a cardinal symptom, closely linked to the position of the ‘sun’ in the sky, is *Suryāvarta*. Approximately 14% of the population suffers from frontal sinusitis, which primarily afflicts individuals between the ages of 20 and 30 and is less common in children. *Piper longum* (*Pippali*) and *Glycyrrhiza glabra* (*Yashtimadhu*) constitute the ingredients of a traditional paste formula. The objective of this review was to investigate the effectiveness of this herbal paste formula in the treatment of frontal sinusitis. Information regarding frontal sinusitis was gleaned from *Ayurvedic* scriptures, contemporary texts, and earlier research studies from primary and secondary sources. Subsequently, a comprehensive survey of the literature was conducted for these two herbs in the selected paste, which was then scrutinized for their *Pancha Padārtha* (five elements of the herb) and pharmacological qualities related to the management of frontal sinusitis. *Ayurvedic Pancha Padārtha* analysis has revealed that the selected herbal formula is efficacious in managing *Suryāvarta*. While the majority of studies have demonstrated the anti-inflammatory effects of the herbal formula, reviewed articles have also highlighted additional qualities that alleviate the symptoms of frontal sinusitis. Based on the literature review and *Pancha Padārtha* analysis, the selected herbal formula proves to be valuable in the management of frontal sinusitis.

**Keywords**– Anti-inflammatory, Frontal sinusitis, Pippali (*Piper longum*), *Suryāvarta*, *Yashtimadhu* (*Glycyrrhiza glabra*), Traditional Paste Formula

## INTRODUCTION

Frontal sinusitis is frequently referred to as an “office headache” since it interferes with people’s daily tasks. One of the most prevalent illnesses, sinusitis, is thought to affect 30% of the population as a whole. The Para nasal sinuses’ mucosal inflammation can be either an acute or chronic condition [1]. The frontal bone contains two paired lobulated chambers called frontal sinuses. Each frontal sinus opens into its corresponding middle meatus via the infundibulum, and they are situated posterior to the superciliary cavities. They are not present at birth, and they start to grow in the second year of life. Frontal sinuses are not radiographically detectable until the age of five [2].

Despite improvements in the diagnosis and management of acute frontal sinusitis, intracranial complications continue to occur frequently. Any intracranial collection must be surgically removed immediately, but there

is still debate over how to treat the associated sinusitis, which can also be caused by infection. Therefore it is important to review the selected paste. *Suryāvartha* is created by vitiating *Rakta* (blood) and *Vāta* (body humour). In this study, the *Vāta* was primarily relieved by the paste. Therefore, this study assesses the efficacy of *Suryāvarta*'s treatment of the condition by reducing *Vāta*. As well as selected paste is economically feasible, easy to use and reduces the epidemiology of frontal sinusitis [3].

One of the two varieties of *Shirashoola* (headache) that fall under the *Urdwajatru Vikāra* (diseases above clavicle) is *Suryāvarta*. The *Suryāvarta* has emerged as a frequent cause of lifestyle disruption, the potential for depression, psychological elements, family relationships, and daily activities. The *Dōshas*, *Raktās* and *Vāta*, which are vitiating in the *Masthishka Pradēsha* (head area), are a result of the *Ahāravihārajanya* (foods and regimen) *Nidānas* (causes). The heat of the sun causes the vitiating *Dōshās* in the *Masthishka* to liquefy during sunrise, which causes a severe headache. The intensity of the discomfort decreases with the sunset [4].

*Suryāvarta* symptoms include excessive exposure to smoke, sunlight, mist, indulgence in water sports, sleep deprivation, sweating, eastern breeze, controlling tears, excessive weeping, and consuming huge amounts of water and wine. By indulgence in these and similar causes the *Dōsas* get aggravated and produce diseases in the head [4]. In *Suryāvarta* therapies such as Nasal Medication etc. should be administered, Food should consist predominantly of meat of animals of arid regions, and preparations of rice boiled with milk and added with ghee. *Nasya Karma* (nasal instillation of medicine) is the prime treatment in all types of *Shirōrōga* (diseases of the head), with *Ghruthapāna* (drinking of ghee), *Nasya*, *Virēchana* (purgation), *Shirōbasti* (retention of medicine on the head) etc. as its treatment. According to *Ashtānga Hrdaya* (teacher) exposure to smoke, Sunlight and snow (mist, dew), indulgence in water sports, Sleep and keeping awake and severe sweating are the causes of *Suryāvarta*[5]. *Sheethōpachāra* (indulge in cold things) and *Ushnōpachāra* (indulge in hot things) are sometimes used to treat pain. It entails each of the *Tridōshās* (all 3 body humours) [6]. *Mādhava Nidhāna* (classical texts) mention that this headache increases with the sunrise and decreases with the sunset [7].

The current study is based on an *Ayurvedic* medicinal paste that is used in frontal sinusitis and written over a traditional formula. The study critically analyzed the pharmacological activities of the ingredients in selected formulas in the management of frontal sinusitis.

## AIMS & OBJECTIVES

The study was created to determine the anti-inflammatory activity of the ingredients in selected herbal formula in the management of frontal sinusitis.

## RESEARCH METHODOLOGY

This research utilized a comprehensive methodology to assess the efficacy of the chosen *Ayurvedic* herbal formula for the management of *Suryāvarta* (Frontal Sinusitis). This methodology comprised two primary components. Firstly, a systematic literature review was conducted to collect data from both traditional *Ayurvedic* texts and contemporary medical literature.

### A Comprehensive Literature Review

In-depth examination of authentic *Ayurvedic* classics, including *Charaka Samhitā*, *Susruta Samhitā*, *Ashtānga Samgraha*, *Mādhava Nidāna*, and the *Ayurveda Pharmacopoeia*, to establish the historical context and traditional understanding of *Suryāvarta*. An extensive review of contemporary medical literature A comprehensive literature search was carried out from January 2023 to July 2023, including encompassing

textbooks, research articles, and official medical websites, to gain insights into current perspectives on frontal sinusitis.

## B Investigation of Herbal Components

Detailed study of the specific herbal components, *Piper longum* (*Pippali*) and *Glycyrrhiza glabra* (*Yashtimadhu*), constituting the *Ayurvedic* herbal formula. A thorough examination of the pharmacological properties of these herbs, with a particular emphasis on their proven anti-inflammatory and analgesic effects and other potential therapeutic qualities based on laboratory tests.

## C Limitations

We acknowledge certain limitations in our methodology,

The availability and interpretation of data from traditional *Ayurvedic* sources may vary, potentially affecting the comprehensiveness of our historical analysis. In the review of contemporary medical literature, we recognize the possibility of publication bias, where studies with positive results may be more likely to be published, potentially influencing our findings. Interpretations of *Ayurvedic* texts can vary among scholars and practitioners, which may introduce subjectivity into our analysis.

## REVIEW OF FORMULA

An herbal Formula chosen from a traditional formula has two ingredients: (Table 1).

Table I Review of Selected Herbs

Ingredients	<i>Piper longum</i>	<i>Glycyrrhiza glabra</i>
Family	Piperaceae	Fabaceae
Sanskrit name	<i>Pippali</i>	<i>Yashtimadhu</i>
Part used	Fruit and root	Roots and stolen

### *Piper longum* (*Pippali*)

Wild populations of *Piper longum* a climber, can be found in Vietnam, Malaysia, Sri Lanka, Nepal, and India. The leaves are uncomplicated. The petiole has grooves, varies in length, and can grow to a maximum of 10 cm. The inflorescence is an opposite-facing, 1.5–5 cm long, cylindrical, slightly bent spike. The globose, drupaceous fruits have a diameter of 0.2 cm. Except for the volatile piperine, the essential oil obtained from *Piper longum* fruits is a complicated mixture made up of three different compounds: bisabolene, pentadecane, and -caryophyllene. The fruit oil of *Piper longum* also contains sesamin, pulvuatilol, fargesin, terpinolene, zingiberene, para-cymene, p-methoxyacetophenone, and dihydrocarveol. *Pippali* has *Katu* (pungent) *Rasa*, *Laghu* (light) *Theekshna* (penetrating) *Guna*, *Madhura* (sweet) *Vipāka*, *Ushna* (hot) *Virya* and *Vāta Kapha Shāmaka* (pacify) action.

The fruit of the pippal plant, *Piper longum* Linn., includes a variety of substances, including volatile oil, alkaloids, isobutylamides, lignans, and esters. Fruit's primary ingredient, piperine, is thought to have powerful anti-inflammatory properties. Piperine may be to blame for the anti-inflammatory effects seen in this study [8]. Using carrageenan-induced rat oedema, a decoction of *Piper longum* fruits was found to have a significant anti-inflammatory effect [9]. Supercritical fluid extract (SE) had greater cytotoxicity and anti-inflammatory effects than the other two extracts. Eight isolated compounds were shown to have greater anti-inflammatory action than indomethacin, and compounds were discovered to have anti-inflammatory impact

for the first time [10], [11], [12], [13].

*Piper longum* root powder is dissolved in water and administered orally to mice and rats in doses of 200, 400, and 800 mg/kg. Each group's reaction time delay to thermal stimulus in rats and number of writhings in response to chemical stimulation in mice are measured. Statistics are used to analyze the outcomes. *Piper longum* at doses of 400 and 800 mg/kg exhibits notable Non-Steroid Anti-inflammatory Drugs (NSAID) like analgesia. This suggests that *Piper longum* root possesses substantial NSAID-type analgesic activity but modest opioid analgesic activity [14], [15], [16], [17].

Piperine from the roots of *Piper longum* was exposed to petroleum ether extract testing to determine its anti-oxidant efficacy. It has been discovered that piperine and pet ether extract exert 74.12 and 72.13% inhibition at 50 mg mL<sup>-1</sup> concentration, respectively. In treated rats, pretreatment with pet ether extract and piperine lowers the level of lipid peroxide while maintaining glutathione levels close to normal. The current investigation demonstrates that piperine and plant root extract have antioxidant effects and provide protection against frontal sinusitis [18], [19].

The current study compares the *Piper longum Churna* macerated extract's anti-tussive activity to that of other commercially available preparations and the reference drug Codeine phosphate using guinea pig cough models caused by acetic acid. When compared to other commercially available preparations as well as standard dosage, the in-house formulation's (92.15%) percentage suppression of cough episodes was highly significant. Thus, the current investigation supports the historical statements made about *Piper longum Churna*'s effectiveness in treating sinusitis. Also, *Piper longum* has immune stimulant and expectorant properties [20].

### ***Glycyrrhiza glabra* (Yashtimadhu)**

*Glycyrrhiza glabra* is an herbaceous perennial shrub that attains a maximum height of 6 feet. It contains pinnate leaves with 10-15 leaflets, and leaves are about 10-15cm long. This plant contains purple to pale whitish-coloured flowers. Fruits are oblong pods that contain several seeds inside it. Roots are light brown and used for many medical purposes. Glycyrrhizin, a triterpene saponin with a low haemolytic index, accounts for around 2-9% of the chemical composition of *Yashtimadhu*. The aglycon of glycyrrhizin, glycyrrhetic (glycyrrhetic) acid, is also found in the root (0.5-0.9%). *Yashtimadhu* has *Madhura Rasa*, *Guru Snigdha* (unctuous) *Guna*, *Madhura Vipāka*, *Sheeta* (cold) *Virya* and *Vāta Pitta Hara* (reduce) action.

In the in vitro investigation, glycyrrhizin prevented neutrophils, a powerful mediator of tissue inflammation, from producing reactive oxygen species (ROS). It was believed that this inhibitory effect was the cause of one of its anti-inflammatory effects. Additionally, glabridin therapy in cells decreased the production of (ROS). *Glycyrrhiza glabra* and glyderinine, an isoflavonoid derivative of glycyrrhizic acid found in licorice, demonstrated an anti-inflammatory activity through the production of glabridin, galbrene, glabrone, and shinpterocarpin [21]. Dihydrostilbenes, which are produced from the leaves of the *Glycyrrhiza glabra* plant, have antioxidant, anti-inflammatory and antigenotoxic properties. Pinocembrin was found in leaf extracts and tested for its antiproliferative, antioxidant, and antibacterial properties in earlier investigations on native *Glycyrrhiza glabra*. Following column chromatography, pinocembrin was identified as the main component of the entire extract and was recoverable from the methanol fraction. According to research in the literature, pinocembrin is a flavonoid that has anti-inflammatory and antioxidant activities [22], [23], [24], [25], [26].

In laboratory experiments on rats, the methanolic extract of *Glycyrrhiza glabra* roots (250 and 500 mg/kg) exhibited significant anti-inflammatory and analgesic effects. When subjected to carrageenan-induced paw oedema, the extract notably reduced oedema production. Additionally, an acetic acid-induced writhing test, demonstrated a strong analgesic effect, leading to a substantial reduction in writhing compared to control and standard groups. These findings provide valuable evidence for the dose-dependent analgesic and anti-

inflammatory properties of the extract, particularly in mitigating peripheral pain mechanisms [27], [28], [29], [30].

Within three days of the patient's acute sinusitis infection lasting 11 days, *Glycyrrhiza glabra* may have assisted in symptom relief. During this time, the patient had periodically received different treatments with only modest results. We postulated that *Glycyrrhiza glabra* may have alleviated her symptoms by lowering inflammation, serving as an antioxidant, or regulating cortisol levels by interacting with cortisol receptors. The immune stimulant and expectorant action of *Glycyrrhiza glabra* may have also assisted in the patient's recovery. Whether used alone or in conjunction with other antiviral or mucolytic medications, *Glycyrrhiza glabra* may be a useful therapeutic agent for the treatment of an acute case of viral or bacterial sinusitis [31].

## RESULTS AND DISCUSSION

In Ayurveda, classical texts such as *Madhāva Nidāna*, *Charaka Samhitā*, and *Ashtānga Hrdaya Samhitā* provide valuable insights into the etiology, pathogenesis, symptoms, and treatment of *Suryāvarta* (Frontal Sinusitis). *Susruta Samhitā* offers a comprehensive explanation of the treatment of *Suryāvarta*, which contributes to our understanding of this ailment.

Applying the principles of *Pancha Padārtha* analysis in Ayurveda, we can deduce that the selected herbal formula exhibits anti-inflammatory properties due to its *Vēdanasthāpana* (pain-reducing) *Guna*. Analyzing the *Rasa* (taste) of the selected ingredients, we find a prominent presence of *Katu* (pungent) and *Madhura* (sweet) *Rasa*. Among the *Gunas* (qualities), *Laghu* (light), *Theekshana* (sharp), *Guru* (heavy), and *Snigdha* (unctuous) are prominent. Both herbs share a *Madhura Vipāka* (post-digestive taste). Additionally, the selected paste contains both *Ushna* (hot) and *Sheeta* (cold) *Virya* (potency). *Suryāvarta* is primarily caused by the vitiation of *Rakta* (blood) and *Vāta* (air), and this study suggests that the paste effectively alleviates these imbalances, making it suitable for *Suryāvarta* treatment. Both herbs also pacify *Vāta Dōsha*. The combination of *Katu Rasa*, *Madhura Rasa*, *Madhura Vipāka*, *Guru Guna*, *Snigdha Guna*, and *Ushna Virya* acts antagonistically to *Vāta*, contributing to the effectiveness of the treatment. *Sheeta Virya* additionally pacifies *Rakta* and *Pitta*, reducing inflammation by *Ayurvedic* principles [32].

The literature review of research articles supports the anti-inflammatory and analgesic properties of both herbs in the selected paste, which contribute to reducing inflammation and pain associated with frontal sinusitis. Additionally, the selected paste exhibits antioxidant actions, which further aid in reducing inflammation. Oxidative stress, characterized by an imbalance between reactive oxygen species (free radicals) and endogenous antioxidant defences, can lead to cellular damage, including DNA, protein, and membrane lipid damage. This oxidative stress may result in various health issues, including inflammation. Therefore, antioxidants play a crucial role in mitigating inflammation related to frontal sinusitis.

It's worth noting that immunostimulants and expectorants may also be relevant in the management of frontal sinusitis, particularly if allergies contribute to the condition. Immunostimulants can help modulate the body's response to allergens, while expectorants assist in expelling excess mucus and thick substances associated with frontal sinusitis.

## CONCLUSION

Frontal sinusitis as an important public health problem has been discussed in recent decades worldwide. *Piper longum* and *Glycyrrhiza glabra* are useful in the control of frontal sinusitis according to the review of the literature and the *Pancha Padārtha* examination.

The previous studies of pharmacological effects have revealed that the herbs in the selected herbal formula

have strong anti-inflammatory capabilities. There is an urgent need to reduce the prevalence of frontal sinusitis among people worldwide.

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